Claims

[c1] What is claimed is:

1. A control unit comprising:
a housing enclosing various operational circuitry to control operation of an internal combustion engine; and
a number of operating condition indicators located within an engine compartment and electronically connected to at least a portion of the various operational circuitry.

[c2] 2. The control unit of claim 1 wherein the number of operating condition indicators is configured to provide one indication of operational condition during engine start-up and another during engine running.

[c3] 3. The control unit of claim 2 wherein the number of operating condition indicators during engine start-up is configured to indicate at least:
activation of a kill switch;
sensed crankshaft position;
acceptable charging level; and
drive transmission engagement.

[c4] 4. The control unit of claim 3 wherein at least one of the

number of operating condition indicators is configured to indicate whether the drive transmission is in neutral.

[c5] 5. The control unit of claim 3 wherein at least one of the number of operating condition indicators is configured to indicate that a battery system is providing a minimum voltage output.

[c6] 6. The control unit of claim 2 wherein the number of operating condition indicators during engine running is configured to indicate at least:
a charging system fault;
an injector/ignition system fault;
a sensor system fault; and
an engine lubrication/temperature fault.

[c7] 7. The control unit of claim 6 wherein at least one of the number of operating condition indicators is configured to indicate if any system voltage is low.

[c8] 8. The control unit of claim 6 wherein at least one of the number of operating condition indicators is configured to indicate at least one of:
open circuit at a fuel injector of the internal combustion engine;
open ignition primary;
ignition voltage below acceptable value;

shorted injector; and
fuel pump malfunction.

[c9] 9. The control unit of claim 6 wherein at least one of the number of operating condition indicators is configured to indicate if any input received by the at least a portion of the various operation circuitry is indicative of a fault condition.

[c10] 10. The control unit of claim 9 wherein another one of the number of operating condition indicators is configured to indicate at least one of:
oil injector circuit of oil injection system connected to internal combustion engine is open;
loss of feedback from oil pressure indicator; and
engine overheating.

[c11] 11. The control unit of claim 1 wherein each operating condition indicator is configured to independently illuminate.

[c12] 12. The control unit of claim 1 wherein the at least a portion of the various operational circuitry is configured to illuminate each operating condition indicator at start-up if no start-up fault condition is deemed present.

[c13] 13. The control unit of claim 1 wherein the at least a portion of the various operational circuitry is configured

to illuminate at least one of the operating condition indicators during engine running if an engine running fault condition is present.

[c14] 14. The control unit of claim 1 further comprising non-volatile memory configured to maintain a history of operating condition indicator activation.

[c15] 15. The control unit of claim 14 wherein the non-volatile memory is configured to be accessible by a servicer for accessing the history.

[c16] 16. The control unit of claim 1 wherein the number of operating condition indicators includes four indicators mounted directly to the housing and further comprising a legend affixed to the outer surface of the housing, wherein the legend includes a textual description of indication possible with each indicator.

[c17] 17. The control unit of claim 1 incorporated into one of an outboard motor, snowmobile, ATV, PWC, motorcycle, scooter, and lawn equipment.

[c18] 18. An outboard motor comprising:
an internal combustion engine; and
a multi-mode set of fault indicators mounted directly to a portion of the internal combustion engine, wherein the set of indicators provides at least one form of feedback

to a user regarding at least one of an operational condition at start-up and an operational condition during running.

[c19] 19. The outboard motor of claim 18 wherein the at least one form of feedback includes a visual feedback.

[c20] 20. The outboard motor of claim 19 wherein the set of indicators is configured to illuminate at engine start-up if no engine fault conditions are deemed present and at least partially illuminate during engine running if a fault condition is deemed present.

[c21] 21. The outboard motor of claim 20 wherein the set of indicators includes a separate indicator to indicate each of the following at engine start-up:
kill switch activation;
sensed crankshaft position;
acceptable charging level attained; and
acceptable drive gear position.

[c22] 22. The outboard motor of claim 21 wherein one indicator is configured to change condition if the drive gear position is in neutral at start-up.

[c23] 23. The outboard motor of claim 20 wherein the set of indicators includes a separate indicator to indicate each of the following during engine running:

charging system malfunction;
injection/ignition system malfunction;
sensor system malfunction; and
engine lubrication/engine temperature malfunction.

[c24] 24. The outboard motor of claim 19 further comprising a control unit mounted to the internal combustion engine and wherein the multi-mode set of fault indicators is mounted to the control unit in a manner visible to a user when only a top cover of the outboard motor is removed.

[c25] 25. The outboard motor of claim 24 wherein the control unit includes a recordable medium accessible by a service technician and configured to maintain a history of any fault indicator.

[c26] 26. The outboard motor of claim 19 wherein the internal combustion engine is a two-stroke internal combustion engine.

[c27] 27. The outboard motor of claim 19 further comprising a battery to supply a voltage to a plurality of electronic components.

[c28] 28. The outboard motor of claim 19 wherein the internal combustion engine is a rope-start engine.

[c29] 29. An engine monitoring system configured to control

illumination of a set of indicators based on engine operation according to:
change illumination of the set of indicators indicating engine starting condition; and
change illumination of the set of indicators indicating an engine running condition.

[c30] 30. The system of claim 29 further configured to illuminate the set of indicators if acceptable engine starting conditions deemed present.

[c31] 31. The system of claim 30 further configured to illuminate the set of indicators if:
kill switch not engaged;
drive transmission in neutral;
crankshaft position sensed; and
charging system operating properly.

[c32] 32. The system of claim 31 further configured to sense crankshaft position and charging system operation during engine cranking.

[c33] 33. The system of claim 29 further configured to illuminate at least one of the set of indicators to indicate an unacceptable engine running condition deemed present.

[c34] 34. The system of claim 33 further configured to illuminate a respective indicator of the set of indicators if:

charging system not operating properly during engine running;
injector/ignition system fault deemed present;
auxiliary system fault deemed present; or
engine overheating/oil pump failure.

[c35] 35. The system of claim 27 further configured to maintain a log of indicator illumination that is accessible by a service technician.

[c36] 36. The system of claim 29 wherein the engine is an internal combustion engine and the set of indicators is mounted on an ECU in proximity to the internal combustion engine.